

WHAT IS CLAIMED IS:

1. A method for processing compressed, noisy digital images, comprising the steps of:

(a) processing initial first color data of an image to obtain reconstructed first color data thereof by

(a)(1) computing a transform representation of initial first color data for each of a plurality of blocks of the image, each computed transform representation comprising a plurality of transform coefficients,

(a)(2) thresholding and scaling the transform coefficients in each block, and

(a)(3) inverting the thresholded and scaled transform coefficients in each block to determine a reconstructed first color value for a designated pixel each block;

(b) determining spatially local maps between at least a portion of the initial first color data and at least corresponding portions of each of initial second and third color data of the image; and

(c) estimating reconstructed second and third color values for the designated pixel in each block from selected reconstructed first color values obtained in step (a) using the maps determined in step (b) to obtain reconstructed second and third color data of the image.

2. The method of claim 1, wherein each of the plurality of blocks encompasses a neighborhood of pixels, each block having a respective designated pixel for which the reconstructed first color value is determined.

3. The method of claim 2, wherein processing step (a) is performed until a reconstructed first color value has been determined for each pixel in a particular neighborhood before proceeding to steps (b) and (c) in which reconstructed second and third color values are estimated for the corresponding designated pixel from the reconstructed first color values in that neighborhood.

4. The method of claim 1, wherein the first color data is green color data, the second color data is red color data, and the third color data is blue color data.

5. The method of claim 4, further comprising the step of performing a hue shift on the reconstructed green, red and blue color data.

5 6. The method of claim 1, further comprising the step of interpolating the reconstructed image data to a different resolution.

7. The method of claim 1, wherein the thresholding in step (a)(2) is soft-thresholding.

8. An apparatus for processing compressed, noisy digital images, the apparatus  
10 comprising:

a transform domain processing module configured to process initial first color data of an image, the transform domain processing module including

a transform block processor configured to compute a transform  
representation of initial first color data for each of a plurality of blocks of the image,  
15 each computed transform representation comprising a plurality of transform coefficients, and

a transform coefficient processor configured to threshold and scale the transform coefficients in each block, and to invert the thresholded and scaled transform coefficients in each block,

20 whereby the transform domain processing module determines a reconstructed first color value for a designated pixel in each block; and

a reconstruct module configured to (i) determine spatially local maps between at least a portion of the initial first color data and at least corresponding portions of each of initial second and third color data of the image and (ii) estimate  
25 reconstructed second and third color values for the designated pixel in each block from selected reconstructed first color values using the determined maps to obtain reconstructed second and third color data of the image.

9. The apparatus of claim 8, wherein each of the plurality of blocks processed by the transform domain processing module encompasses a neighborhood of pixels, each block having a respective designated pixel for which the reconstructed first color value is determined.

5 10. The apparatus of claim 9, wherein the reconstruct module estimates reconstructed second and third color values for the corresponding designated pixel in a particular neighborhood from the reconstructed first color values in that neighborhood, after a reconstructed first color value has been determined for each pixel in that neighborhood.

10 11. The apparatus of claim 8, wherein the first color data is green color data, the second color data is red color data, and the third color data is blue color data, and the apparatus further comprises a hue shift module configured to perform a hue shift on the reconstructed green, red and blue color data.

12. The apparatus of claim 8, further comprising an interpolation module  
15 configured to interpolate the reconstructed image data to a different resolution.

13. The apparatus of claim 8, wherein the apparatus comprises a computer or printer.

14. A machine-readable medium having a program of instructions for directing a machine to process compressed, noisy digital images, the program of instructions  
20 comprising:

(a) instructions for processing initial first color data of an image to obtain reconstructed first color data thereof by

(a)(1) computing a transform representation of initial first color data for each of a plurality of blocks of the image, each computed transform  
25 representation comprising a plurality of transform coefficients,

(a)(2) thresholding and scaling the transform coefficients in each block, and

(a)(3) inverting the thresholded and scaled transform coefficients in each block to determine a reconstructed first color value for a designated pixel each block;

5 (b) instructions for determining spatially local maps between at least a portion of the initial first color data and at least corresponding portions of each of initial second and third color data of the image; and

10 (c) instructions for estimating reconstructed second and third color values for the designated pixel in each block from selected reconstructed first color values obtained in step (a) using the maps determined in step (b) to obtain reconstructed second and third color data of the image.

15. The machine-readable medium of claim 14, wherein each of the plurality of blocks encompasses a neighborhood of pixels, each block having a respective designated pixel for which the reconstructed first color value is determined.

15 16. The machine-readable medium of claim 15, wherein processing instructions (a) are performed until a reconstructed first color value has been determined for each pixel in a particular neighborhood before proceeding to instructions (b) and (c) which direct that reconstructed second and third color values be estimated for the corresponding designated pixel from the reconstructed first color values in that neighborhood.

20 17. The machine-readable medium of claim 14, wherein the first color data is green color data, the second color data is red color data, and the third color data is blue color data.

18. The machine-readable medium of claim 17, further comprising instructions for performing a hue shift on the reconstructed green, red and blue color data.

25 19. The machine-readable medium of claim 14, further comprising the step of interpolating the reconstructed image data to a different resolution.

20. The machine-readable medium of claim 14, wherein the thresholding in (a)(2) is soft-thresholding.